PATENT
33168-2130

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	John Skoufis
Serial No.	:	09/879,613
Filed	:	06/12/2001
For	:	PEROXIDE PRESERVATION
Group Art Unit	:	3728
Examiner	:	Mohandesi, Jila M.

APPELLANT'S SUBSTITUTE APPEAL BRIEF

Board of Appeals and Interferences
Director for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an Appeal from the final rejection of Claims 1, 3-5, 9 and 12 in the above-identified patent application.

This Substitute Brief is submitted in response to the Order of the Board dated March 8, 2006, and the Official Action mailed March 20, 2006. The informalities noted in the Order and Official Action have been corrected in this Brief.

It is believed that the $500.00 Appeal Brief Fee already has been charged to Deposit Account No. 50-0540. However, if not, please charge any deficiency or credit any over payment to Deposit Account No. 50-0540.

REAL PARTY IN INTEREST

The real party in interest is Illinois Tool Works, Inc., the Assignee of this patent application.

RELATED APPEALS AND INTERFERENCES

Appellants is not aware of any related appeals or interferences which directly affect, or are directly affected by, or have a bearing on the Board's decision in this appeal.

STATUS OF CLAIMS

Claims 1, 3-5, 9 and 12, all of the pending claims, have been finally rejected.

STATUS OF AMENDMENTS

All amendments have been entered.

SUMMARY OF THE CLAIMED SUBJECT MATTER

The claimed subject matter provides a method of packaging extremely clean PVA sponge brushes such as the sponge brush 12 shown in Figure 1. Such brushes are used to scrub semiconductor wafers from which semiconductor devices are made[1]. The method is covered by Claims 1, 3, 4 and 5. The invention also provides ultra-clean PVA sponges made by use of the method. The sponges are covered by Claims 9 and 12.

The cleanliness requirements for PVA (polyvinyl alcohol) sponges used in semiconductor manufacturing are very stringent.

[1] Specification, page 1 ("S1" hereinafter) lines 12-14

Such sponges must have very, very low levels of impurities. These impurities include metal ions, anionic materials such as chlorides, fluorides, phosphates and bromides, and particulates[2].

In the manufacture of semiconductor devices, objectionable particulates even include bacteria, which often are of the same order of magnitude in size as the spacings between conductors in such devices[3].

To ensure that the products are clean enough to meet such stringent requirements, they are washed by the manufacturer using very strictly-controlled and very special washing procedures, and then packaged in sealed containers before shipment to the customers.

The sponges are shipped in sealed containers with water to keep the sponges wet, so as to prevent them from drying out and thereby becoming unusable[4].

Since the sponges may be required to stay in their packages for many months before they are used, the growth of bacteria in the packages must be prevented; otherwise, the bacteria will contaminate the sponges and make them useless[5].

Various methods have been used or proposed for preventing such bacteria growth, such as the use of e-beam or gamma

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[2] S2, lines 19-23
[3] S3, lines 1-3
[4] S1, lines 15-29

radiation, and the addition of various chemicals to the liquids wetting the sponges[6].

The problem recognized by the inventor is that chemical additives themselves often are impurities or develop metallic ions if they remain in the package until it is opened[7]. This is a difficult problem which this invention solves in a clever and inexpensive way.

The invention uses a very low concentration of hydrogen peroxide in de-ionized water in the package as a bactericide. The concentration level is well below the levels suggested for use in the past. This is defined in the claims on appeal which are set forth below:

> 1. A method of packaging a PVA sponge for use in scrubbing semiconductor wafers (S, lines 12-14), said method comprising:
>
> (a) placing said sponge in a flexible plastic bag (bag 20, Figure 1; S6, lines 2-3 and 5-18);
>
> (b) said sponge containing a quantity of de-ionized water with around 0.05% to around 0.5% by volume of hydrogen peroxide (S5, lines 17-24; S7, lines 1-9); and
>
> (c) sealing said bag (S6, line 18).
>
> 3. A method as in Claim 1 in which said quantity of de-ionized water with hydrogen peroxide is between an amount sufficient to wet said sponge and an amount necessary to saturate said sponge (S6, line 2-3).

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[5] S2, lines 1-6
[6] S2, lines 2-14
[7] S1, lines 20-23; lines 1-6

4. A method as in Claim 1 in which the volume of hydrogen peroxide is around 0.1% (S7, line 3).

5. A method of packaging a PVA sponge brush (12, Fig. 1), said method comprising placing said cleaning article in a plastic bag (20, Fig. 1), said sponge brush containing a quantity of de-ionized water (S7, line 1), said water containing hydrogen peroxide in an amount effective to kill and retard the growth of bacteria in said cleaning article but less than an amount sufficient to develop significant quantities of metallic ions in said container (S5, lines 6-24; S7, lines 4-9), and sealing said container (S6, line 18), in which said amount of hydrogen peroxide is about 0.05% to around 0.5% by volume (S5, lines 17-24; S7, lines 1-9).

9. A packaged PVA sponge (12, Fig. 1) for use in clean rooms, said cleaning article having particulate, metal ion and anionic counts at or below the values specified for a clean room (S2, lines 19-23; S3, lines 1-6), said package comprising a sealed flexible plastic bag, said sponge being positioned in said bag (sponge 12, bag 20, Fig. 1), and containing a quantity of de-ionized water (S7, line 1), said de-ionized water containing hydrogen peroxide in a concentration effective to kill and retard the growth of bacteria in said sponge, said amount being low enough to substantially ensure decomposition of said hydrogen peroxide in a relatively short period of time after the container is sealed and being between 0.05% and 0.5% by volume (S5, lines 19-23; S3, lines 1-6).

12. A cleaning article as in Claim 9 in which said cleaning article is a PVA sponge for scrubbing semiconductor wafer surfaces (S7, line 3), and said concentration of hydrogen peroxide is around 0.1 percent by volume (S7, line 3).

The concentration of hydrogen peroxide is high enough to kill bacteria when the cleaning article is first put into the package, but so low that it is ensured that the hydrogen

peroxide will decompose into its components, water and oxygen, shortly after the package has been sealed[8].

The result is that the hydrogen peroxide does not remain in contact with the sponge over a long period of time and thus cannot develop metallic ions as impurities. Furthermore, when the package is opened, the hydrogen peroxide is gone and thus cannot constitute a contaminant. The result is a cleaner sponge, with neither bacteria nor hydrogen peroxide.[9]

The use of such low concentrations of hydrogen peroxide is contrary to the teachings of the prior art and produces a new and highly advantageous result which has not been predicted by those skilled in the art.

CLAIM GROUPINGS

The pending claims are set forth in the Appendix.

Following are the groupings of the claims.

A. Claims 1 and 3 stand or fall together.

B. Claims 4 and 5 do not stand or fall together or with any other claims.

C. Claims 9 and 12 stand or fall together.

GROUNDS OF REJECTION

The only ground of rejection to be reviewed on this Appeal is the rejection of Claims 1, 3-5 and 9 and 12 as being

[8] S 5, lines 6-13

unpatentable under 35 U.S.C. §103(a) over U.S. Patent 6,012,576 to Onodera, in view of 5,988,371 to Paley et al.

In the Final Rejection dated December 3, 2004, on page 2, the Examiner contends that Onodera '576:

> "discloses all of the limitations of the claims except for the container to be a flexible plastic bag and the specific degree of range of the hydrogen peroxide."

The Examiner argued that Paley '371 discloses storing a cleaning article in a flexible bag which can be opened and resealed for future use and can be easily shipped and handled. Therefore, it would have been obvious to modify Onodera as taught by Paley.

Specifically, although admitting that Onodera does not disclose the range of concentrations of hydrogen peroxide set forth in the claims, the Examiner argued that this is obvious because:

"discovering the optimum or workable ranges involves only routine skill in the art."

ARGUMENT

Each of the six claims on appeal calls for a PVA sponge and a quantity of de-ionized water with around 0.05% to around 0.5% by volume of hydrogen peroxide, in a plastic bag.

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[9] S 4, lines 17-24; S 5, lines 1-11

Neither of the cited references discloses the concept of using very low concentrations of hydrogen peroxide to ensure rapid decomposition of the hydrogen peroxide and thus prevent it from being a source of impurities.

In fact, neither reference shows or suggests the use of such low concentrations for any purpose.

ONODERA REFERENCE

Onodera discloses a method for storing a sponge brush by removing the brush from the scrubbing apparatus using it and placing the brush in a container containing a bactericidal liquid such as an aqueous solution of 1% to 5% hydrogen peroxide, or sodium hypochlorite, or formalin, or water with ethyl or isopropyl alcohol. (Column 3, lines 8-11).

First, the Examiner incorrectly asserts that Onodera discloses a concentration of hydrogen peroxide low enough to ensure fast decomposition, and cites Column 3, lines 1-11 of the patent to support this interpretation.

Column 3, lines 1-11 of Onodera are quoted below in their entirety (with lines 66-67 of Column 2, for the sake of completeness):

> "For example, the brush 5 can be stored in the shell 2 without becoming dry by putting the brush 5, whose member 8 is soaked with water, into the shell 2 and, tightly sealing the shell 2 with the top 3. In this case, the shell 2 may be filled with water 6. In addition, when the

> shell 2 is filled with a bactericidal liquid or a liquid that prevents multiplication of bacteria, instead of water, it is possible to prevent bacterial contamination when the brush is to be stored for a very long time, such as a few months or about half a year. Examples of bactericidal liquids include an aqueous solution of 1 to 5% hydrogen peroxide, an aqueous solution of sodium hypochlorite or formalin, or water with ethyl alcohol or isopropyl alcohol added thereto. Another effective way to ..." [Emphasis added]

There is no statement in that passage which would support the Examiner's contention.

Onodera says nothing in that passage or anywhere about wanting the hydrogen peroxide to decompose. In fact, Onodera strongly implies that the hydrogen peroxide should remain effective as a bactericide for a "very long time", such as a few months to about half a year. Thus, Onodera teaches one to use more bactericide to ensure that the bactericidal effect last long enough.

The teaching that the bactericide should retain its effectiveness for a long time also is found in Column 3, lines 14-18:

> "The most preferable method to present [sic] bacterial contamination is to heat the brush 5 along with the shell 2 and the top 3 in order to kill off any bacteria, and then storing the brush 5 in a bactericidal liquid."

There would be no purpose in adding the bactericide after using heat to kill the bacteria unless it were done for the

purpose of preventing the multiplication of bacteria for as long as the sponge is stored in the container -- for up to six months.

Again, in Column 4, lines 54-57, Onodera states:

> "According to the present invention, a brush formed by a sponge-like member or fibrous member is stored in a container for a few months to a half a year while it is in a wet state."

Onodera then continues, in Column 4, lines 58-62:

> "If necessary, in order to kill off any bacteria the brush and the container storing the brush are heated, or the brush is dipped into a bactericidal liquid filled in a closed container and stored therein."

Onodera concludes by saying, in Column 4, lines 63-65:

> "In addition, the brush stored in the container will not be contaminated by multiplication of bacteria."

Thus, Onodera clearly teaches that the bactericide should remain effective for the full time of storage of the sponge, and that a concentration of 1% to 5% hydrogen peroxide will do just that.

Therefore, not only does Onodera fail to teach the deliberate use of low concentrations to ensure rapid decomposition of the hydrogen peroxide, but Onodera actually teaches the opposite; make sure you use enough to retain the bactericidal effect for the full time of storage.

THE PALEY REFERENCE

Paley et al, the secondary reference which is cited to show the use of plastic bags as containers, supports the above interpretation of Onodera.

Paley discloses packaging for clean-room wipers in which a cleaning liquid is stored in a sealed plastic pouch resting atop the dry wipers, both being enclosed by a sealed larger plastic bag. The liquid is prevented from contacting the wipers until the pouch is punctured to release the liquid into the wipers just prior to their use. This prevents deterioration due to contact of the wipers by the liquid during a possibly long time while the package is stored on the shelf before use.

The outer bag can be opened and resealed by an adhesive flap, as shown in Figure 2, allowing removal of wet wipers from the outer bag and then re-sealing of the bag.

In Column 10, lines 12-19, the use of de-ionized water as a cleaning fluid is described. It is stated that a bactericide can be used in the water, but that its effectiveness is reduced by prolonged contact with the wipers, and that the bactericide may introduce contaminants into the wipers.

Paley's solution is to keep the bactericide-containing water from contacting the wipers until just prior to their use. Thus, Paley teaches the need to maintain the effectiveness of

the bactericide for a long time, and to prevent deterioration of the bactericide over time.

Therefore, the only prior art of record consistently teaches the need to maintain the effectiveness of bactericides over time, and thus teaches away from the invention.

Deliberately ensuring rapid decomposition of the hydrogen peroxide is counter-intuitive and unobvious.

OTHER LIMITATIONS

The Examiner also erroneously contends that other limitations of the claims are disclose by Onodera.

Each of the claims calls for the use of de-ionized water with hydrogen peroxide. The Examiner contends that Onodera shows the use of de-ionized water,[10] but does not cite any location in the patent at which it is shown.

Actually, only "water" is described (see Column 3, lines 1, 3 and 10). De-ionized water is not mentioned.

Claim 9 specifies that the sponge has "particulate, metal ion and anionic counts at or below the values specified for a clean room". These values are required for new sponges but might not be required for sponges such as those stored by Onodera, in which the sponges are stored after use in scrubbing

[10] See: Final Rejection, page 2, paragraph 2, line 7.

wafers. In any event, the Examiner is incorrect in stating that Onodera discloses such a sponge.

LEGAL AUTHORITY

The Examiner relies on In Re Aller, 105 U.S.P.Q. 233 (CCPA, 1955) for the statement that:

> "... since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art."

Thus, the Examiner contends that Applicant has done nothing more than discover the optimum or workable ranges of concentrations for hydrogen peroxide.

This is not correct because Applicant's invention has created a new result; the deliberate rapid decomposition of the bactericide. This produces a sponge which is bacteria-free without any hydrogen peroxide as a contaminant, and without the metallic ions which can be caused by prolonged contact between the hydrogen peroxide and the sponge.

In the Aller case, there was no such new result. The Applicant merely claimed greater efficiency or yield from the prior art process by specifying specific process temperature and sulfuric acid concentration ranges somewhat different from those disclosed by the prior art. The CCPA characterized the

differences as merely differences of degree rather than differences of kind. (105 PQ 235-236)

Here, there is a difference in kind, in that the low ranges produce deliberate rapid decomposition of the hydrogen peroxide, with attendant unexpected advantages of removing two further sources of contamination beyond the bacteria.

The Aller ruling is inapplicable to this case for the further reason that its holding is based upon the old "obvious to try" test, which has been held to be improper in a long line of Federal Circuit Court decisions decided much more recently than 1955, when the Aller case was decided.

The CCPA ruled, in essence, that it would have been obvious to try other values, when it stated (105 PQ 237):

> "The skilled chemist who chose to experiment with the reference process would undoubtedly try the conditions defined by the claims, although he might be surprised at the extent of improvement obtained. No invention is involved in the discovering optimum ranges of a process by routine experimentation. In re Swain et al., supra."

Typical of the numerous decisions by the CAFC discrediting the "obvious to try" test is the case of Gillette v. S.C. Johnson Son Inc., 16 USPQ.2D 1923 (Fed. Cir. 1990).

In that case, the defendants' argument that it would have been "obvious to try" was held to be an incorrect test for obviousness (16 USPQ.2d at 1928).

Instead, the Court ruled, the analysis of the invention must include consideration of the results obtained by the invention (16 PQ.2d 1928).

> "Critical to the analysis is an understanding of the particular results achieved by the new combination."

The superior properties of the invention supported the finding of unobviousness.

Here, the analysis specified by the Gillette case shows that the new result of the very low range claimed, namely, the deliberate rapid decomposition of the bactericide, produces the highly beneficial reductions of contaminant sources, well beyond the mere extermination of bacteria. These results are not predicted by the prior art, and are unexpected. The invention is unobvious.

The invention is unobvious for the further reason that the prior art teaches away from the invention.

As it has been discussed above, the prior art clearly teaches that a bactericide should remain effective for very long periods of time. This is totally contrary to the concept of deliberately decomposing the bactericide.

For the foregoing reasons, the invention is unobvious and the claims should be allowed.

Respectfully submitted,

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Claims Appendix

A. Claims On Appeal

1. A method of packaging a PVA sponge for use in scrubbing semiconductor wafers, said method comprising:

(a) placing said sponge in a flexible plastic bag;

(b) said sponge containing a quantity of de-ionized water with around 0.05% to around 0.5% by volume of hydrogen peroxide; and

(c) sealing said bag.

3. A method as in Claim 1 in which said quantity of de-ionized water with hydrogen peroxide is between an amount sufficient to wet said sponge and an amount necessary to saturate said sponge.

4. A method as in Claim 1 in which the volume of hydrogen peroxide is around 0.1%.

5. A method of packaging a PVA sponge brush, said method comprising placing said cleaning article in a plastic bag, said sponge brush containing a quantity of de-ionized water, said water containing hydrogen peroxide in an amount effective to kill and retard the growth of bacteria in said cleaning article but less than an amount sufficient to develop significant quantities of metallic ions in said container, and

sealing said container, in which said amount of hydrogen peroxide is about 0.05% to around 0.5% by volume.

9. A packaged PVA sponge for use in clean rooms, said cleaning article having particulate, metal ion and anionic counts at or below the values specified for a clean room, said package comprising a sealed flexible plastic bag, said sponge being positioned in said bag, and containing a quantity of de-ionized water, said de-ionized water containing hydrogen peroxide in a concentration effective to kill and retard the growth of bacteria in said sponge, said amount being low enough to substantially ensure decomposition of said hydrogen peroxide in a relatively short period of time after the container is sealed and being between 0.05% and 0.5% by volume.

12. A cleaning article as in Claim 9 in which said cleaning article is a PVA sponge for scrubbing semiconductor wafer surfaces, and said concentration of hydrogen peroxide is around 0.1 percent by volume.

EVIDENCE APPENDIX

(No evidence was submitted under §§ 1.130, 1.131, or 1.132)

RELEATED PROCEEDINGS APPENDIX

There are no related proceedings to list in this Appendix.